

Curriculum Vitae



PERSONAL INFORMATION

First name / Surname **Battisti Lorenzo**

Address C.so 3 Novembre, 63, 38100 Trento, Italy

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E-mail lorenzo.battisti@ing.unitn.it
info@lorenzobattisti.it

Nationality Italian

Date of birth 25.10.1963

Gender Male

Married with Tiziana (+17), two childs, Sofia (14) and Federico (14)

OCCUPATIONAL FIELD **Mechanical Engineer, Professor, University**

WORK EXPERIENCE

Dates **2014 Full professor qualification**

Dates **2002 onwards**

Occupation or position held **Associate Professor**

Main activities and responsibilities Head of the Turbomachinery Lab

Name and address of employer DICAM - Department of Civil, Environment and Mechanics , Faculty of Engineering, University of Trento, Italy

Type of business or sector (For Italy alone) Area CAR 09 – Industrial and information Engineering ING-IND/08

Dates **1993 -2002**

Occupation or position held **Assistant Professor**

Main activities and responsibilities Responsible of the Turbomachinery Laboratory

Name and address of employer Department of Mechanical and Structural Engineering, Faculty of Engineering, University of Trento, Italy

Type of business or sector Turbomachinery, energy conversion systems

Dates **1991-1993**

Occupation or position held **Contract Engineer**

Main activities and responsibilities Development of the Turbomachinery Laboratory

Name and address of employer Department of Mechanical and Structural Engineering, Faculty of Engineering, University of Trento, Italy

Dates **1989-1991**
Occupation or position held **Environment and industrial risk manager.**
Name and address of employer MEMC Monsanto electronic materials, Sinigo (BZ), Italy
Main activities and responsibilities Industrial hygiene assessment plan, executive protocol for waste treatment.
Type of business or sector Management of tests

EDUCATION AND TRAINING

Dates **2010-2013**
Title of qualification awarded **Ph.D**
Name and type of organisation providing education and training University of Udine (Italy)
Principal subjects/occupational skills covered **Wind turbine operations in cold climates and anti-icing design**

Dates **1995-1996**
Title of qualification awarded **Postgraduate Diploma in Fluid-Dynamics, option Turbomachinery**
Principal subjects/occupational skills covered Experimental testing of turbomachinery, Fluid-dynamics
Name and type of organisation providing education and training von Karman Institute for Fluid-dynamics (Bruxelles – Belgium), an AGARD-NATO Institute

Dates **1982-1988**
Title of qualification awarded **Mechanical Engineering**
Principal subjects/occupational skills covered Disinfection of civil water by means of dioxide chloride: plant design and operation
Name and type of organisation providing education and training University of Padova, Italy
Level in national or international classification Master Degree

PERSONAL SKILLS AND COMPETENCES

Mother tongue **Italian**
Other language(s)

Self-assessment
European level ()*

English
German
French
Spanish

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
C1	Proficient user	C2	Proficient user	C1	Proficient user	C1	Proficient user	C1	Proficient user
B1	Independent user	B1	Independent user	A1	Basic user	A1	Basic user	A1	Basic user
B1	Independent user	B1	Independent user	A1	Basic user	A1	Basic user	A1	Basic user

(*) [Common European Framework of Reference for Languages](#)

TECHNICAL SKILLS AND COMPETENCES

Thermal and fluid-dynamic quantities measurements;
 Data acquisition and measurements post-processing;
 Fortran programming
 Gas turbines design,
 Water steam turbine design,
 ORC plants design,
 Design and testing of wind turbines
 Wind measurements
 Development of wind parks in not conventional sites

ORGANISATIONAL SKILLS AND COMPETENCES

Coordination of a team of 4-7 people in the Turbomachinery Laboratory,
 Volleyball Coach: Italian Federation (FIPAV) First Degree Qualification.

ARTISTIC SKILLS AND COMPETENCES

Harpichord and transverse flute player,
 Harpichord restoration and historic analysis
 Author of books of poetry

SYNTHETIC DESCRIPTION OF THE SCIENTIFIC ACTIVITY FIELDS

MAIN TOPICS

- Gas and steam turbines, cycle analysis and blade/combustion chamber cooling;
- Hydrogen technology in gas/steam turbines;
- Technology of renewable energies: wind power and hydraulic power.
- Wind energy

The area of investigation deals with fluid machines fluid dynamic and heat transfer. After several years of work on gas and steam turbines, cycle analysis, blade/combustion chamber cooling, and hydrogen technology in gas/steam turbines, his research interest moved to the field of technology of renewable energies: wind power and hydraulic power. In the field of wind power particular emphasis has been put on small wind energy systems. In 2007 a wind turbine test field has been established (www.eolicotrento.ing.unitn.it) with the aim to analyze two topics: wind energy exploitation in cold climates and technology and efficiency analysis of different concepts of small wind turbines, in particular solutions able to harvest more energy in low windy regions. The vertical axis wind turbine architecture has been deeply investigated in the years either from the experimental and numerical point of view gaining important advancements in the knowledge of fluid dynamic and structural behaviour of small wind turbines. The skills gained in the field of performance prediction, design, and testing of vertical axis wind turbines was determinant for engagement within the consortium of the FET European project on offshore floating VAWT (*Deepwind*) in 2010. He was also coordinator of the 2009 PRIN national project on *Fluid dynamic analysis of vertical axis wind turbines*. Beside these scientific activities he is engaged in numerous design and testing activities of small wind turbines commissioned by leading wind turbine manufacturers. Recently his research group acquired a medium size wind tunnel test to carry out more detailed tests on vertical wind turbine aerodynamics.

SUB- TOPICS

Turbines

- Heat transfer in turbomachinery
- Transpiring and effusing systems for cooling of gas turbines
- Innovative gas turbines for hydrogen cycles
- Innovative concepts for small wind turbines
- Innovative concepts for small hydraulic turbines
- Operation of wind turbines in cold climates
- Anti-icing systems for wind turbines

Energy vectors

- Safety Hydrogen handling;
- Hydrogen production from renewable energies

Renewable energies

- Small wind turbines
- Wind turbines for not-conventional sites

PATENTS

GB 2 355 017 - Porous Element for the effusive cooling of Machine Component; 23.09.1999

GB 2 356 684 - Boundary Layer Control using Electroformed Micro-Porous Material; 23.11.1999

US 6,488,238 - Boundary Layer Control of aerodynamic airfoils; 03.12.2002

PCT/IB03/04551 - De-icing and anti-icing arrangement for wind energy converting systems; 27.11.2005

WO2007138452 (A2) Method For Implementing Wind Energy Converting Systems; 02.03.2009

MX2010003358 (A) System And Method Of Plating Metal Alloys By Using Galvanic Technology; 23.06.2010.

WO2007138450 (A1) Method and system for detecting ice on aerodynamic surfaces; 10.02.2012.

OTHER TITLES

Award of best product of the research 2001-2003 of the Trento University for the area ICAR 09 Ingegneria industriale e dell'informazione, D.L. 205 del 5.6.98, art. 5: US 6,488,238 - Boundary Layer Control of Aerodynamic Airfoils.

Winner of a NATO-CNR Senior Fellowship Programme 1998. Title of the Research Project: "Transient Heat Transfer Measurement Technique on Hot Surface Models" carried out at the Von Karman Institute-Bruxelles.

Delegate of the Italian Government by the Technical Option Committee - Refrigeration, AC and Heat Pumps of United Nations Environmental Programme (UNEP) and co author of the 1998 Protocol.

IEA - XIX ANNEX "Wind Energy in Cold Climate" Italian delegate 2005-2007.

Member ETN European Turbine Network (2005-2008).

Member of the Panel of Experts of Italian Ministry of Economy for Renewable Energies (DM 7.4.06 – wind energy).

NATIONAL AND INTERNATIONAL GRANTS

Future Deep Sea Wind Turbine Technologies, ENERGY.2010-2014.10.2-1: Future Emerging Technologies for Energy Applications (FET), Coordinator Danmarks Tekniske Universitet Risø DTU (136 k€); - The Trento unit was responsible for numerical modeling of the model for experiments in Denmark in Roskilde Fjord, and the fluid-dynamic experimental test on the model in the Politecnico of Milano wind tunnel..

Fluid dynamic analysis of vertical axis wind turbines PRIN 2010- Funded in 2011, duration 24 months - National Coordinator Prof. Lorenzo Battisti. (475 k€);

Development of zero emission hydrogen propelled cycles – Development of a Hydrogen District in Porto Marghera (UE-MATT Projects) - 2006-2009.Coordinator ENEL Research PISA, (55 k€);

Rapporto sullo stato dell'arte delle energie rinnovabili e dei vettori energetici puliti" Commissionato da Servizio Energia ed Assessorato all'urbanistica Provincia Autonoma di Trento. Giugno 2003, Responsabile scientifico Prof. Lorenzo Battisti (24 k€)

Linee guida per la valutazione dell'impiego dell'energia eolica sul territorio Commissionato da Servizio Energia Provincia Autonoma di Trento. Luglio 2004 Responsabile scientifico Prof. Lorenzo Battisti (61 k€)

MAIN CONTRACTS

Hydro technology for energy recovery of reverse osmosis system - water treatment plant, Project contractor Saipem (2015) (30 k€).

Progetto di una turbina eolica con pale in legno composito (design of an innovative wind turbine with wooden composite blades), Project contractor Defino&Giancaspro srl. (2015) (90 k€).

Analisi sperimentale delle prestazioni di una turbina eolica da 10 kW (experimental tests on a 10 kW wind turbine), Project contractor Pentawind srl. (2015) (43 k€)

Progettazione di un micro generatore eolico per l'ambiente urbano (design of a micro wind turbine for urban environments), Project contractor Fondital SpA (2014) (30 k€)

Analisi delle resa energetica di miniturbine eoliche (analysis of efficiency of small wind turbines), Experimental Test Field of Trento for Small wind turbines Trento, 2006-2010 – www.eolicotrento.ing.unitn.it (360 k€)

Concezione, progetto e prototipazione di turbine eoliche urbane ad alto contenuto di innovazione (Ideation, design and prototyping of urban wind turbines and small wind turbines with high innovation), Project L.P. 6/99, Contractor TOZZI-SUD, 2006-2010 (3,1 M€)

Sistema integrato di condizionamento ed antighiaccio per aerogeneratori eolici di concezione innovativa (analysis, development and optimization of the energy aspects of an anti-icing system, and technical-economic efficiency of an innovative wind turbine) Contractor Leitner S.p.A. 2002-2004 (204 k€)

More than 20 Wind Site analysis and assessments

More than 10 Wind Parks due diligences

TEACHING ACTIVITY

The teaching has been carried out continuously since 1993 at the University of Trento mainly within the course of industrial engineering degree, supplying the basic teaching of Fluid Machine, Machine Design, Mechanics, Industrial Plants.

Currently the candidate teaches the following courses for the Master's Degree in Energetic Engineering:

- **Fluid Machines Engineering** (9 credits, in English)
- **Wind Power Systems** (6 credits, in English)

And the following course for the Degree Course in Environmental and Land Engineering, and Degree course in Civil Engineering:

- **Machine and Machine Elements** (6 credits, in Italian)

ORGANIZATION OF HIGH FORMATION COURSES

University Master (II Level) in Energy Engineering, IDEE University of Trento: **Wind Energy (4 ETCS)**:

First Edition. March-April 2005 Role: organization and main lecturer.

Second Edition. May 2006 Role: organization and main lecturer.

Third Edition. Sept. 2007. Role: organization and main lecturer.

Fourth Edition. May-Sept 2008: Role: organization and main lecturer.

Fifth Edition. Sept. 2009: Role: organization and main lecturer.

University Master (II Level) in Wind Energy, University of Milano and Genova, May 2004 (1 ETCS):
Role: lecturer.

Special course on **Ice Prevention on Wind Turbines**, (16-17-18. November 2004). Birk Innovation Center Birk Centerpark (Herning – Danmark)

PARTICIPATION TO PH. D SCHOOLS

Member of the Scientific Board of the Ph.D. School of University of Udine from 2002 to 2010.
During this period I was tutor of 5 Ph.D students

Member of the Scientific Board of the Ph.D. School of University of Trento from 2015 . During this period he was tutor of 1 Ph.D student

PARTICIPATION TO SPECIAL COURSES

- Introduction to Measurement Techniques**, Oct. 1994 - Von Karman Institute, Bruxelles;
- La Fluidodinamica Numerica nello Studio delle Macchine** Nov. 1994 - by Cilea, Consorzio Interuniversitario Lombardo per L'elaborazione Automatica;
- Measurement Techniques** Jan.1995 - Von Karman Institute, Bruxelles ;
- Heat Transfer and Blade Cooling in Gas Turbines**, May 1995 -Von Karman Institute, Bruxelles;
- Turbomachinery blade Design Systems**, Febr. 1999 -Von Karman Institute, Bruxelles;
- Simulation Methods Used for the In-flight Icing Certification of Aircraft, Helicopters and Jet Engines**, Nov 6-9 2012 Lyon by Newmerical Technologies International;

INTERNATIONAL ENDORSEMENT

International Master Science in Wind Energy (Polytechnic of Copenhagen DTU -Danish Technical University)

- June 2004 **"Wind Turbine Ice Prevention Systems Selection and Design"**, (Special course 41326 – 6 ETCS).
- June 2005 **"Wind Turbine Ice Prevention Systems Selection and Design"**, (Special course 41326 – 6 ETCS).
- June 2006 **"Wind Turbine Operation in Cold Climates"**, (Special course 41326 – 6 ETCS).
- June 2007 **"Wind Turbine Operation in Cold Climates"**, (Special course 41326 – 6 ETCS).
- June 2008 **"Wind Turbine Operation in Cold Climates"**, (Special course 41326 – 6 ETCS).
- June 2009 **"Wind Turbine Operation in Cold Climates"**, (Special course 41326 – 6 ETCS).

Aim/objective of the course:

To give an exhaustive analysis of wind energy exploitation in hostile climates, with particular emphasis to the methodology for the design of ice prevention systems (IPSs).

Wind energy exploitation in hostile climates: motivation, assessment of sites in cold climates, wind turbine operations in cold climates, influence on reliability and availability, safety, influence on loads and power production.

Economics: economic break-even analysis for an IPS, estimation of costs, model for the estimation of the energy requirement in icing periods.

Analysis and evaluation of anti-ice heat fluxes requirement: modeling the physics of ice formation mechanism, basics of heat transfer, analysis of heat flux contributions, influence of climatic and wind turbine variables (geometric and functional) on thermal power requirements, sensitivity analysis, optimum turbine type for icing conditions.

Review of technical solution in use for wind energy exploitation in cold climates: IPSs concepts comparison and discussion, technical solution comparison, energetic efficiency of an IPS. Influence of wind turbine typology, size, control strategy and off condition operations on IPS selection, design and performance. IPS and wind turbine optimum matching procedure.

Detailed analysis of a thermal based IPS: design and discussion.

New frontiers: the regenerative option, the intermittent heating, emerging solutions for IPSs.

INVITED LECTURE -

Lecture **Wind Energy and the Energy Market** at Venice International University VIU, Theme: Clean Energy and Climate Change, (Venezia Isola di san Servolo) 2013, 2014, 2015

Lecture Series **"WIND ENERGY – A state of Art**, (17-23 March 2007) by von Karman Institute for Fluid-Dynamics (Brussels – Belgium)

Wind Power, Invited lecture, Porter School Of Environment, Telaviv, Israel, 18 Nov. 2009.

Opportunities of Small wind Technology, Invited lecture, Eilat-Eilat Int. Conference, Eilat, Israel, 17-18 Feb. 2010.

INSTITUTIONAL DUTIES

- Board member of the University of Trento (2004-2008)
- Representative of Researchers in the Faculty Council (1996-1998 and 1998-2000).
- Member of the 'Edilizia Ponte' Committee, Faculty of Engineering (2004-05)

PAPERS IN GAS TURBINE AND HEAT TRANSFER AREA

- L. BATTISTI, R. FEDRIZZI, **2D Numerical Simulation of a Wind Turbine De-Icing System Using Cycled Heating**", Wind Engineering, VOLUME 31, NO. 1, 2007.
- L. BATTISTI, P. BAGGIO AND R. FEDRIZZI , **"Warm-Air Intermittent De-Icing System for Wind Turbines"** , Wind Engineering, VOLUME 30, NO. 5, 2006.
- G. CERRI, L. BATTISTI, R. FEDRIZZI, A. GIOVANNELLI **"Advances in Effusive Cooling Techniques of Gas Turbines**, Applied Thermal Engineering, 2006 Elsevier Limited
- L. BATTISTI, R. FEDRIZZI, G.CERRI **"Novel Technology for Gas Turbine Blade Effusion Cooling"** GT2006-90516, ASME Turbo Expo 2006: Power for Land, Sea and Air, May 8-11, 2006, Barcelona, Spain.
- G.CERRI, L.BATTISTI, G. SORAPERRA, **"Non-Conventional turbines for Hydrogen Fueled Power Plants"**. ASME GT2003-38324
- L.BATTISTI, P. BAGGIO **"Experimental Determination of average turbulent heat transfer and Friction Factor in Stator Internal Rib -Roughened Channels"** in Heat Transfer in Gas Turbine Systems, Annals of the New York Academy of Sciences Volume 934, Editor Richard J. Goldstein, 2001
- CERRI, L.BATTISTI, **"Valve Control for Optimum Performance in Compression Refrigeration Cycles"**, Heat Recovery System & CHP 1994 Vol.14, N.1 pp.61-66

CONFERENCE PROCEEDINGS IN GAS TURBINE AND HEAT TRANSFER AREA

- L. BATTISTI, R.FEDRIZZI, S. DAL SAVIO, A.GIOVANNELLI, **"Influence of the and Size of Wind Turbines on Anti-icing Thermal Power Requirement "**, Proceedings of EUROMECH 2005 Wind Energy Colloquium, 4-7 Oct. 2005, Oldenburg – Germany, Springer Verlag 2007
- L. BATTISTI, R.FEDRIZZI, M. RIALTI, S. DAL SAVIO, **A model for the design of hot-air based wind turbine ice prevention system** WREC05 22-27 May 2005 Aberdeen
- L. BATTISTI, P. BAGGIO, R. FEDRIZZI, **Numerical simulation of a wind turbine warm-air intermittent de-icing system** 4th International Conference on Computational Heat and Mass Transfer, Proceedings of 4th ICCHMT, May 17–20, 2005, Paris-Cachan, FRANCE ICCHMT'05 – 231.
- L. BATTISTI, R. FEDRIZZI, , G. SORAPERRA S, **Analysis of the finned stator thermal effectiveness of the Leitwind MW class wind turbine** PID46956 WREC05 22-27 May 2005 Aberdeen.
- L. BATTISTI, et al. **"Experimental analysis of the heat transfer coefficient of winged surfaces for turbomachinery applications.** (Previsione sperimentale dello scambio termico di superfici alettate per applicazioni nelle macchine a fluido" MIS-MAC VIII 28 Firenze - Maggio 2004
- L. BATTISTI, et al. **"Experimental analysis of the thermo-fluid-dynamic field past the electric stator of a HAWT** (Indagine sperimentale del campo termo-fluidodinamico a valle del rotore di turbine eoliche ad asse orizzontale)" MIS-MAC VIII 28 Firenze – 05/ 2004
- L. BATTISTI, E. BERTOLAZZI, and F. TRIVELLATO, **"Numerical Processing of Temperature Data"**, WIT press, ISBN: 1-85312-705-1, ISSN: 1369-7331, Advanced computational methods in Heat Transfer VII", 2004.
- L. BATTISTI, G. CERRI, G. SORAPERRA, S. BORGHETTI, **"Emerging solutions in hydrogen fuelled power plants"**, HYPOTHESIS V , Hydrogen – POver Theoretical and Engineering Solutions International Symposium, 7-10 September 2003 PORTO CONTE – ITALY
- L.BATTISTI, J.M. CHARBONNIER **"Transient Radiant Heat Transfer Measurement Technique on Hot Surface Models"** Von Karman Institute Preprint, March 2000, pp. 44
- L.BATTISTI, P. BAGGIO, **"Experimental Determination of average turbulent heat transfer in a rib-roughened channel"**, Atti del XVI Congresso Nazionale sulla Trasmissione del Calore, Siena 17-19 giugno 1998.

G.CERRI, L.BATTISTI, C.SALVINI, "Parametric Analysis of a Vapour Compression Refrigeration Plant Steady State Behavior", Proceedings of IIR Conference on Emerging Trends in Refrigeration & Air-conditioning, March 1998 New Delhi India

L.BATTISTI, AND T. SCHMEER, "Experimental Study of the Surface Heat Transfer Enhancement in a Rib-Roughened Blade Cooling Channel By Means of Double Layer Thin Film" 55 Eurotherm International Congress, 16-19 September 1997, Santorini, Grece.

L.BATTISTI, T.ARTS, "Wall Heat Transfer Measurements in Rib-Roughened Cooling Channels by Means of a Transient Technique", Atti 51° Convegno ATI, Udine 16-20 Settembre 1996

L.BATTISTI, "Thermal Characteristics of Rib-Roughened Cooling Channels by Means of a Transient Technique" Project Report 1996-01, Von Karman Institute for Fluid Dynamics, June 1996, pp.88.

L.BATTISTI, "Experimental evaluation of the heat transfer coefficients of fluidized beds operating at atmospheric pressure (Valutazione dei Coefficienti di Scambio Termico in Letti Fluidizzati Funzionanti a Pressione Atmosferica)" Atti Cagliari MIS-MAC III Metodi di Sperimentazione nelle Macchine Ottobre 1994

F.FERRARI, G.CERRI, L.BATTISTI, et al., "Interventi su un motore diesel trcilindrico ad iniezione diretta per l'incremento delle prestazioni", 1° Convegno Nazionale - Progetto Finalizzato Trasporti 2 - CNR, Roma, Atti pp. 1354-1383, 19-21 Ottobre 1993

PAPERS IN WIND ENERGY AREA

BATTISTI L., PERSICO G., BRIGHENTI A., BENINI, E., RACITI CASTELLI M., DOSSENA V., PARADISO B., **Experimental benchmark data for h-shaped and troposkien vawt architectures**, submitted to Journal of Renewable & Sustainable Energy Reviews, August 2016.

PERSICO, G.; DOSSENA, V.; PARADISO, B.; BATTISTI, L.; BRIGHENTI A; BENINI E. (2016) "Time-Resolved Experimental Characterization of the Wakes Shed by H-shaped and Troposkien Vertical Axis Wind Turbines", submitted to Journal of Energy Resources Technology on March 2016. Under review.

BATTISTI, L.; BRIGHENTI A; BENINI E.; RACITI CASTELLI M.; S. DELL'ANNA; DOSSENA, V.; PERSICO, G.; PAULSEN, U. S., PEDERSEN T. F. (2016) "Normalized performance and load data for the Deepwind demonstrator in controlled conditions", Data in Brief (2016), <http://dx.doi.org/10.1016/j.dib.2016.07.029i>.

BATTISTI, L.; BRIGHENTI A; BENINI E.; RACITI CASTELLI M.; S. DELL'ANNA; DOSSENA, V.; PERSICO, G.; PAULSEN, U. S., PEDERSEN T. F. (2016) "Wind Tunnel Testing of the DeepWind Demonstrator in Design and Tilted Operating Conditions", Energy 111(2016):484-497.

BATTISTI, L., BRIGHENTI, A., BENINI, E., DOSSENA, V., PERSICO, G., PARADISO, B. (2015). **Three dimensional character of VAWT wakes: an experimental investigation for H-shaped and Troposkien architectures**, in Proceedings of the ASME Turbo Expo 2016, New York, NY: The American Society of Mechanical Engineers, in Proceedings of ASME Turbo Expo 2016, Seoul, South Korea., June 13-17, 2016..

BATTISTI, L., DOSSENA, V., PERSICO, G., DELL'ANNA, S., BENINI, E., AND BRIGHENTI, A. (2015). **An Experimental Study of the Aerodynamics and Performance of Vertical Axis Wind Turbine in Confined and Non-Confined environment**, ASME Journal of Energy Resources Technology, 137(5), p. 051207

L.BATTISTI, L. ZANNE, A. BRIGHENTI, M.RACITI CASTELLI, . **A generalized method to obtain airfoil databases over 180 degrees**, submitted to AIAA journal on August 20, 2015

BENEDETTI, M., FONTANARI, V., BATTISTI, L., **Structural health monitoring of wind towers: Residual fatigue life estimation** 2013 Journal of Smart Materials and Structures

IONESCU, R.D., RAGAZZI, M., BATTISTI, L., RADA, E.C., IONESCU, G., **Potential of electricity generation from renewable energy sources in standard domestic houses**, 2013 WIT Transactions on Ecology and the Environment

L. BATTISTI, F.TRIVELLATO, G.MIORI, **The ideal power curve of small wind turbines from field data**, 2012 Journal of Wind Engineering and Industrial Aerodynamics

L. BATTISTI, L. ZANNE, S DELL'ANNA, V. DOSSENA, G. PERSICO, B. PARADISO, **Aerodynamic measurements on a vertical Axis wind turbine in a large scale wind tunnel**, Journal of Energy Resources Technology, Transaction of ASME, Vol. 133, n. 3, Sept. 2011

CONFERENCE PROCEEDINGS IN WIND
ENERGY AREA

M.R. CASTELLI, G ARDIZZON, L BATTISTI, E BENINI, **Modeling Strategy and Numerical Validation for a Darrieus Vertical Axis Micro-Wind Turbine**, ASME 2010 International Mechanical Engineering Congress and Exposition, Vol. 7: Fluid Flow, Heat Transfer and Thermal Systems, Parts A and B, ISBN: 978-0-7918-4444-1, DOI: 10.1115/IMECE2010-39548

L BATTISTI, G SORAPERRA, R FEDRIZZI AND L ZANNE, **Inverse design-momentum, a method for the preliminary design of horizontal axis wind turbines** Journal of Physics: Conference Series 75 (1007) 01213.

BATTISTI, L.; BENINI, E.; BRIGHENTI, A.; SORAPERRA, G., RACITI CASTELLI, M. (2016) **"Simulating the dynamic behavior of a vertical axis wind turbine operating in unsteady conditions"**, The Science of Making Torque from Wind conference (TORQUE 2016), Garching bei München, Germany, October 5-7, 2016. Under review.

RACITI CASTELLI, M.; MASI, M.; BATTISTI, L.; BENINI, E.; BRIGHENTI, A.; (2016) **"Preliminary assessment of the reliability of numerical wind tunnels for VAWT simulation"**, The Science of Making Torque from Wind conference (TORQUE 2016), München, Germany, October 5-7, 2016. Under review.

BATTISTI, L.; BRIGHENTI, A.; BENINI, E.; RACITI CASTELLI, M. (2016) **"Analysis of Different Blade Architectures on small VAWT Performances"**, The Science of Making Torque from Wind conference (TORQUE 2016), München, Germany, October 5-7, 2016. Under review

L. BATTISTI, **RIME-tech, Anti-icing system for Wind Turbines**, WINTERWIND 2011, 8-10 Feb. 2011

L. BATTISTI, **Ice detection system for Wind Turbines**, WINTERWIND 2011, 8-10 Feb. 2011

L. BATTISTI, **Opportunities of SWT technology**, SMALL WIND TURBINE SWT, Newcastle (UK) 2011 3-5 April 2011

L.BATTISTI, F. BAZZANELLA, C. LAZARI, A. BRIGHENTI, **Analysis and comparison of technology for small HAWTS in low-wind sites: control strategies and rotor dimensions**, WIND TURBINE TECHNOLOGY FORUM - WTT2011 15-16 May 2011.

L. BATTISTI, **A Critical Review of Capacity Factor of Italian Wind Plants**, WIND POWER ITALIA, 15-15 June 2011.

L. BATTISTI, S. DELL'ANNA, D. BEDARD, **Criteri di misura del vento nel settore minieolico**, Eolica Mediterranean Expo 2011, 13.16 Sept. 2011.

L. BATTISTI, **Analisi Critica del Fattore di Utilizzazione degli Impianti Motori Eolici in Italia**, 65° ATI, 13.17 Sept. 2010.

L. BATTISTI, A. BRIGHENTI, L. ZANNE L., **Analisi dell'effetto della scelta dell'architettura palare sulle prestazioni di turbine eoliche ad asse verticale**, 64° CONGRESSO NAZIONALE ATI, 6-11 Settembre 2009, L'Aquila

L. BATTISTI, G. MIORI, L. ZANNE, S. DELL'ANNA, **Effetto dei fattori che influenzano la costruzione della curva di potenza di turbine eoliche**, 64° CONGRESSO NAZIONALE ATI, 6-11 Settembre 2009, L'Aquila

L.BATTISTI, D. ZONTA et al. **Photonic crystals for monitoring fatigue phenomena in steel structures**, accepted at SPIE Symposium on The 16th International Symposium on: Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring, 8-12 March 2009 in San Diego, United States.

L.BATTISTI, L.ZANNE, R.FEDRIZZI **"Vento e sisma in Italia: la verifica strutturale delle turbine eoliche"**, Eolica Expo Mediterranean 2008, Roma, Italia, 1-4 Ottobre 2008

L.BATTISTI. **"Wind Turbine aerodynamics"**, Lecture Seres 2007-05 Von Karman institute for Fluid-Dynamics, ISBN-13-978-2-930398-75-3

L. BATTISTI, T. LAAKSO **"State of the Art of Wind Turbines Ice Prevention Systems For Cold Climate Operations"** EWEC 2005 Paper n. 0879 Greece 27 March 2 Febr. 2006.

L.BATTISTI, R. FEDRIZZI, A. BRIGHENTI, T.LAAKSO **"Icing Risk for Offshore Wind Turbines"**, Proceedings of OWEMES 2006 International Conference, Rome, April 2006.

L. BATTISTI, G. SORAPERRA , A.GIOVANNELLI **"Application of Pre-design Methods for HAWT Design"** WREC IX Firenze 4-10 May 2006.

L. BATTISTI, A.GIOVANNELLI, "Wind Turbine Installations for high Elevations" ASME ESDA 2006 - 8th Biennial ASME Conference on Engineering Systems Design and Analysis, Torino 4-7 luglio 2006.

L.BATTISTI, A.BRIGHENTI, A.GIACOMONI, "Fattibilità economica delle miniturbine" Wind Energy – anno 3, n.2/2006

L. BATTISTI, "Considerazioni sul miglioramento tecnologico delle mini-turbine eoliche" Eolica Mediterranean 2005, Rome, Italy, 29 Sept. - 1 Oct. 2005.

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L.BATTISTI, **Wind Turbines in Cold Climates, Icing Impact and Mitigation Systems**, Ed. Springer, ISBN 978-3-319-05190-1, March. 2015

L. BATTISTI, **Gli impianti motori eolici**, ed. LB, ISBN 978-88-907585-0-8, Sept. 2012

SCIENTIFIC DISSEMINATION

L. BATTISTI **Gli ambiti di sviluppo del minieolico in Italia**, published in Qualenergia.it on the 8th of September 2015 (p. 52)

<http://www.qualenergia.it/speciali/20150908-gli-ambiti-di-sviluppo-del-minieolico-italia>

It has registered at the 31st of December 2015, after Google Analytics, 3.120 downloads

L.BATTISTI, **Scelta e installazione delle mini turbine eoliche**, published in Qualenergia.it on the 27th of February 2012 (p. 60)

<http://www.qualenergia.it/speciali/20120225-scelta-e-installazione-delle-miniturbine-eoliche>

It has registered at the 31st of December 2015, after Google Analytics, 29.624 downloads

L. BATTISTI, **CEST - Campo eolico sperimentale di Trento – Wind Turbine test Field of Trento**, 2007-2015.

In 2007 it was inaugurated the structure of the Wind Turbine Test Field Trento (CEST) <http://www.eolicotrento.ing.unitn.it/> a project born by the collaboration between the University of Trento, the Provincial Agency for Energy (APRIE) and private companies.

Main objective of the project was to create in Italy and in Europe a landmark in the study of small wind systems. The experimental wind farm has specific equipment for the analysis and comparison of design characteristics, functional and energy of mini and micro wind turbines. Since one of the purposes connected is to evaluate the possibility of widespread use of these sizes of wind turbines, in addition to the ability to operate in a technically and economically efficient, such a structure also aims to evaluate aspects of environmental impact, acoustic and logistical and requirements infrastructure for their installation and disposal.

Since its creation, CEST was visited by over 200 private companies and Research Institutes operating in the sector, representatives of Italian and foreign universities and colleges. Several dozens of guided visits by secondary and high schools.

Reports of 2007-2015 activity are available on the website. <http://www.eolicotrento.ing.unitn.it/>

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FILMS AND VIDEO

Several teaching movies and small films have been produced in the years on the wind energy topic. Here some links are listed:

- Documentario sul minieolico – Le ali del vento

https://www.youtube.com/watch?v=1xAS3L9T7qs&feature=em-share_video_user

- Documentario sulle prove sperimentali al Politecnico di Milano EU FET Deppwind project (in English)

https://www.youtube.com/watch?v=XD0uY3xl1Y4&feature=em-share_video_user

- Energia eolica a GEO&GEO RAI3

<http://www.rai.tv/dl/RaiTV/programmi/media/ContentItem-621c3002-5091-4165-9f2f-399168de73bf.html>

- Minieolico: è possibile la sua integrazione nella struttura urbana?

<https://www.youtube.com/watch?v=OXMekBrqXFx>

- Kyoto Club - edifici e minielico

<https://www.youtube.com/watch?list=PL36CBB87FD420A270&v=5wMdul69jEQ> (PART 1/3)

<https://www.youtube.com/watch?v=VKa6s4ZXYbl> (PART 2/3)

https://www.youtube.com/watch?v=UCvqG1_Zf1Y (PART 3/3)